

AMENDMENTS TO THE DRAWINGS

Please replace Figures 21-25 with Replacement Sheets Figures 21-25, which are designated by a legend ---Prior Art---.

Attachment: Replacement sheets

REMARKS

Claims of elected species I, claims 1-3, 8, 9, 16, 18 and 19, have been amended as follows: Claim 1 now contains the limitations of original claims 3 and 8; claim 2 has been amended; claims 3 and 8 have been canceled; claim 9 has been amended; claim 18 has been canceled and rewritten into new dependent claims 21 and 22, and claim 19 has been canceled and rewritten as new dependent claims 23 and 24.

The objection to the drawings should be withdrawn as Figures 21-25 now include the legend "Prior Art." The objection to claims 18 and 19 should be withdrawn as these claims have been canceled.

Claims 1-3, 8 and 9 were rejected as being anticipated by Yoshikawa. This rejection is respectfully traversed.

Regarding claim 8, whose limitation, namely, that the anode diffusion region is disposed closer to a side of the channel isolation region than the cathode diffusion region in the first and second photothyristor portions, is now incorporated in claim 1, the Examiner alleges that Yoshikawa's (JP 02-125666 A) apparatus satisfies the claimed structural limitation. However, Yoshikawa fails to disclose that the anode diffusion region (43) disposed *closer* to a side of the channel isolation region (42) than the cathode diffusion region (45) in the first and second photothyristor portions (40a, 40b) as required by claim 1 and supported by Fig. 1 of the specification. In the figures of Yoshikawa that show the device structure, i.e., Figs. 1-5 and 7, the anode diffusion region 22, 25 is disposed *farther* from the side of the channel isolation region 30 than the cathode diffusion region 24, 27 in the left and right photothyristor portions. The cathode 24 of Yoshikawa is clearly shown in Figs. 1-3 and Figs. 5, 7 as being of n-type and buried in the p-type gate diffusion regions 44 and 23. The cathode 45 of the embodiments of the present invention is disposed *farther* from the channel isolation region 42 than the anode diffusion region 43 while the cathode 24 of Yoshikawa is disposed *closer* to the channel diffusion region 30 than the anode diffusion region 22. Consequently, the structural difference of the photothyristors of claim 1 and those disclosed in

Yoshikawa is apparent to persons of ordinary skill in the art. Thus, Yoshikawa does not anticipate claim 1. By virtue of this construction, the bidirectional photothyristor of claim 1 has an advantage disclosed at paragraph [0114] of the specification. Paragraph [0114] refers to Figs. 2 and 3 of the specification and states that the advantage is that the carriers, which remain after an applied voltage is inverted (commutated), are absorbed in the anode diffusion region of inverted channel, so that the commutation characteristic is improved.

Claim 16 has been rejected as being obvious over Yoshikawa further in view of Darwish. This rejection is respectfully traversed.

The Examiner acknowledges that Yoshikawa does not disclose an N+ layer and relies on Darwish to allegedly fill this gap. However, as explained above, Yoshikawa does not even disclose “the anode diffusion region is disposed closer to a side of the channel isolation region than the cathode diffusion region in the first and second photothyristor portions” and Darwish also fails to disclose this limitation. Thus, the prior art does not disclose “the anode diffusion region is disposed closer to a side of the channel isolation region than the cathode diffusion region in the first and second photothyristor portions” *as a whole*.

Darwish relates to a lateral MOS controlled thyristor. The object of Darwish is totally different from that of the present invention. Consequently the n+ buried layer 21 of Darwish functions totally differently from the N+ layer (47) on the back surface of the substrate (41) of the embodiments of the present invention. That is, the n+ buried layer 21 enhances the current carrying capacity of the MCT 10 (col.3, lines 28-31, of Darwish), while N+ layer (47) of the embodiments of the invention reflects carriers so as to increase their equivalent lifetime resulting in increasing the luminous sensitivity and the critical off-set voltage increase rate dv/dt while maintaining proper commutation characteristic, which has a trade-off relation to the critical off-set voltage increase rate dv/dt characteristic (see paragraphs [0108]-[0110] of the specification). Consequently, a person of ordinary skill in the art would not have been motivated to combine the n+ buried layer 21 of Darwish with the photothyristor of Yoshikawa to arrive at the claimed photothyristor.

The Examiner also alleges that the claimed phosphorus concentration range would have been obvious to a person of ordinary skill in the art. The concentration range of 10^{15}cm^{-3} through 10^{18}cm^{-3} is, as shown in Figs. 4 and 5 and described in paragraphs [0094]-[0096], based on the original experiments of inventors to solve the special problem of bidirectional photothyristor that to fulfill the requirement of both the commutation characteristics Icom and the critical off-set voltage increase rate dv/dt charactercttic, which are in trade-off relation to each other. Applicants respectfully submit that the Examiner's argument that the claimed phosphorus range would have been obvious to a person of ordinary skill in the art lacks any evidentiary support or technical reasoning.

Claims 1-3, 8, 9, 16, 18 and 19 were *provisionally* rejected on the ground of nonstatutory obviousness-type double patenting over claims 1-78 of copending Application No. 11/080,522. This rejection is respectfully traversed.

As this is a provisional rejection, Applicants are not required to respond to it at this time.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing docket no. 204552031200.

Dated: July 5, 2006

Respectfully submitted,

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REPLACEMENT SHEETS